MIA-2003-20

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Metal and Nonmetal Mine Safety and Health

Report of Investigation

Surface Nonmetal Mine
(Sand and Gravel)

Fatal Powered Haulage Accident

October 1, 2003

Holly Pit
Eastern Colorado Aggregates
Holly, Prowers County, Colorado
Mine ID No. 05-04537

Investigators

Chrystal A. Dye
Mine Safety and Health Inspector

Steven P. Ryan
Mine Safety and Health Inspector

Barbara J. Renowden
Mine Safety and Health Specialist

George H. Gardner, P.E.
Senior Civil Engineer

Eugene D. Hennen
Mechanical Engineer

Originating Office
Mine Safety and Health Administration
Rocky Mountain District
P.O. Box 25367 DFC, Denver, Colorado 80225
Irvin T. Hooker, District Manager

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OVERVIEW

On October 1, 2003, Jose D. Pina, laborer/operator, age 39, was fatality injured when the forklift he was operating fell into a dredge pond. Pina had been using the forklift to relocate the dredge power cable onto the shoreline, when the shoreline sloughed into the dredge pond.

The accident occurred because adequate mining methods were not used to maintain the stability of the sloping bank in places where persons worked or traveled in performing their assigned tasks. The waste sand shear strength was incapable of maintaining a stable slope with the added dynamic forklift loading.

GENERAL INFORMATION

Holly Pit , a sand and gravel operation, owned and operated by Eastern Colorado Aggregates, was located on U.S. Hwy 50, three miles west of Holly, Prowers County, Colorado. The principal operating official for the company was Randy L. Cochran, foreman. The mine normally operated two, 12-hour shifts per day, five days a week. Total employment was 18 people.

Sand and gravel was mined from an open pit with a suction dredge powered electrically through a 4160 VAC cable attached to a floating discharge pipeline. Raw material was pumped from the dredge to the plant where it was crushed, sized and stockpiled. Finished products were sold for use as construction aggregate.

The last regular inspection of this operation was completed August 19, 2003.

DESCRIPTION OF ACCIDENT

On the day of the accident, Jose Pina (victim) reported to work at 6:00 a.m., his normal starting time. Randy Cochran, foreman, assigned Pina and four other miners to relocate the dredge electrical cable and pipeline from the pond to the north shoreline.

Cochran and Ventura Vasquez, dredge operator, examined the shoreline at the start of the shift. No unusual or unstable ground conditions were observed. At about 9:00 a.m., the five-man crew began work to relocate the cable and pipeline. Pina, Vasquez, and Martin Montoya, laborer, worked from the shoreline of the pond to relocate the cable. A wire rope was attached to the power cable and a forklift was used to pull the cable from the pond. Timoteo Vasquez, dredge operator, and Sigisredo Avalof, laborer, worked from a boat to disconnect and relocate the pipeline. This work progressed without incident.

At about 11:00 a.m., Pina, Montoya and Ventura Vasquez approached an area along the shoreline where the deposited waste sand had formed a small peninsula protruding into the pond. Pina moved the forklift back from the edge of the shoreline about 50 feet because of concern for the possibility of unstable ground conditions due to this peninsula. The wire rope was attached to the cable and before they reattached the other end to the forklift the ground along the shoreline failed.

Ventura Vasquez and Montoya fell into the water. As they attempted to swim to shore a second and third failure occurred causing the forklift to fall into the pond. As Vasquez and Montoya swam to shore, they looked back, and briefly saw Pina resurface before they lost sight of him. Timoteo Vazquez and Avalof had their backs to the shoreline at the time of the failure and were knocked down in the boat by the large waves which ensued.

After Ventura Vasquez reached the shore, he notified other co-workers of the accident and instructed them to call 911. Emergency medical personnel and volunteer divers arrived at the scene. The victim was recovered by the divers, approximately 43 feet from the shoreline beneath approximately 16 feet of water at 2:07 p.m.

The cause of death was attributed to drowning.

INVESTIGATION OF THE ACCIDENT

MSHA was notified at 11:30 a.m., the same day, by a telephone call from Rhonda Newmeister, office manager for Eastern Colorado Aggregates, to Michael Dennehy, supervisory special investigator. An investigation was started the same day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA accident investigators traveled to the mine, made a physical inspection of the accident scene, interviewed employees, and reviewed conditions and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees.

DISCUSSION

Location of the Accident

The accident occurred on the north side of the dredge pond, on hydraulically deposited dredge tailings. The material at the location had been deposited over an approximate four month period of time prior to the accident.

Material was pumped from the pond approximately 1,500 feet to the dewatering/desanding plant through an 18-inch pipeline. The dredge was reportedly capable of dredging to a depth of 75 feet, but typically about 60 feet of material was removed at this operation.

Approximately 30 percent of the raw material was usable. It was crushed, sized and sold for construction aggregate. The remaining 70 percent was waste. It was pumped through an 18-inch pipeline back to the mining area where it was discharged over land. The pipeline near the accident site was located directly behind (north of) the material that sloughed into the pond.

Once discharged, the sand settled and the water and finer particles ran back into the pond. It was determined that a large percentage of the deposited tailings consisted of clean fine sand that the company had no market for. The amount of material that sloughed into the pond could not be determined.

JCB Forklift

The machine involved in the accident was a rough terrain forklift truck, Model No. JCB 506-36 Turbo Loadall, manufactured by J.C. Bamford Excavators Limited. It was provided with a variable reach pivoted boom to carry the forks and had four-wheel drive and steering suitable for use on improved or unimproved terrain. The forklift was powered by a 1000 series Perkins, 96 horsepower, four-cylinder turbocharged diesel engine. The forklift was equipped with a JCB four speed synchro shuttle transmission, with four gears in forward and four gears in reverse. The forklift weighed approximately 20,500 pounds.

The telescopic three-section boom could be extended and retracted by a hydraulic cylinder and could also be raised and lowered about a pivot by hydraulic cylinders. The forks at the front-end of the boom could also be tilted hydraulically forward and backward.

The forklift was positioned about 50 feet from the waters edge at the time of the accident. The forklift was not recovered after the accident; therefore, a determination could not be made regarding the mechanical condition of the forklift.

Weather

The weather was cloudy and dry and was not considered a factor in the accident.

Personnel Protective Equipment

Pina was recovered without a life jacket. No life jacket has since been recovered.

Training

The victim had nine years and five months mining experience, four years and five months with this company. He had received training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

Causal Factor – The forklift was positioned on loose, hydraulically-deposited waste material without the company evaluating the shear strength of the material. The weight and vibration of the forklift exceeded the bank's ability to support it.

Corrective Action – Procedures should be established to determine the stability of tailing deposits prior to allowing mobile equipment or miners access to those areas.

CONCLUSION

The accident occurred because mining methods used would not maintain slope stability in places where persons worked or traveled in performing their assigned tasks. The waste sand shear strength was incapable of maintaining a stable slope with the added dynamic forklift loading.

ENFORCEMENT ACTIONS

Order No. 6298426 was issued on October 1, 2003, under Section 103(k) of the Mine Act:

> A fatal accident occurred at this operation on October 1, 2003, when a miner was attempting to move the 4160-volt power cable to the dredge with a JCB forklift for the purpose of moving the pipeline back towards the dewatering plant. This order is issued to ensure the safety of all persons at this operation. It prohibits all activity south of the railroad tracks until MSHA has determined that it is safe to resume any normal mining operations in the area. The mine operator shall obtain prior approval from an authorized

representative for all actions to recover and/or restore operations to the affected area.

This order was terminated on December 4, 2003. Conditions that contributed to the accident no longer exist and normal mining operations can resume.

Citation No. 6287764 was issued on October 21, 2003, under Section 104(a) of the Mine Act for violation of 56.3130:

> On October 1, 2003, a fatal drowning accident occurred when the hydraulically placed sand tailings, sloughed into the pond. This caused the victim and the JCB forklift he was operating to fall into the water. Reportedly, the tailings sand was beached, sloping gradually to the water's edge. The tailings had apparently been deposited in the same location for some time, and the deposition pattern had formed a peninsula, protruding out into the pond. Hydraulically deposition of the tailings sand creates a very loose soil structure which is sensitive to and can lose strength dramatically when subjected to vibration and/or weight. The victim was working in an already marginally stable partially-submerged slope. Mining methods shall be used that will maintain slope stability in places where persons work or travel in performing their assigned tasks.

This citation was terminated on December 8, 2003. The mine operator established and implemented procedures to determine the stability of tailing deposits at the mine site. The procedures have been posted at the mine site and miners have been trained on the established procedures. Appropriate warning signs have been posted to prohibit mobile equipment and miner activity at tailing deposit areas.

Approved by, Date: December 31, 2003

Irvin T. Hooker
District Manager

APPENDICES

A. Persons Participating in the Investigation
B. Persons Interviewed
C. General Plan Overview

APPENDIX A

Persons Participating in the Investigation

Eastern Colorado Aggregates

James H. Kirkland	general partner
Richard P. Ranson	attorney
Ventura H. Vazquez	dredge operator
Randy L. Cochran	foreman

State of Colorado

Joseph A. Samek	mine safety trainer

Diver

Roger Stagner	volunteer diver

Mine Safety and Health Administration

Chrystal A. Dye	mine safety and health inspector
Steven P. Ryan	mine safety and health inspector
Barbara J. Renowden	mine safety and health specialist
George H. Garner, P.E.	senior civil engineer
Eugene D. Hennen	mechanical engineer

APPENDIX B

Persons Interviewed

Eastern Colorado Aggregates

Martin P. Montoya	laborer
Timoteo H. Vazquez	dredge operator
Ventura H. Vazquez	dredge operator
Randy L. Cochran	foreman